

NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

DEEP TILLAGE

(Acres)

CODE 324

DEFINITION

Performing tillage operations below the normal tillage depth to modify the physical or chemical properties of a soil.

determine soil moisture. Fall is normally the best time of the year to perform Deep Tillage in Wyoming. Crops are removed, the soil is usually dry, and evaporation rates are relatively low.

PURPOSES

This practice may be applied as part of a conservation management system to support one or more of the following:

- Fracture restrictive soil layers.
- Bury or mix soil deposits from wind or water erosion or flood overwash.
- Reduce concentration of soil contaminants, which inhibit plant growth.

Additional Criteria to Fracture Restrictive Soil Layers

Tillage equipment such as chisels, subsoilers, paraplovers, or rippers, with the ability to reach the required depth shall be used.

The depth of tillage shall be a minimum of one inch deeper than the depth of the restrictive layer. Tillage depth should be set carefully and periodically checked to maintain this working depth.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to land having adverse soil conditions which inhibit plant growth, such as compacted layers formed by field operations, restrictive layers such as claypans, overwash or deposits from wind and water erosion or flooding, or contaminants in the root zone.

This standard includes tillage operations commonly referred to as deep plowing, subsoiling, ripping, or row-till, performed from time to time below the normal tillage depth.

Complete fracturing of the restrictive layer may not be required. The fractured zone, as a minimum, shall be sufficient to permit root penetration below the restrictive soil layer.

Additional Criteria to Reduce Concentration of Soil Contaminants Which Inhibit Plant Growth

Tillage equipment such as moldboard plows, disk plows or chisels with twisted points, with the ability to reach the required depth shall be used.

The tillage operation shall mix a sufficient amount of uncontaminated soil with the contaminated material so that the concentration of the contaminant is below the crop tolerance level. Crop tolerance levels shall be established in accordance with Land Grant University guidance, agronomy technical notes or other recommendations found in the Field Office Technical Guide.

CRITERIA

General Criteria Applicable to All Purposes

Deep Tillage operations shall be performed when soil moisture within the restrictive layer is less than 30 percent of field capacity. The "feel test" or other acceptable method may

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The soil contaminant shall be uniformly distributed throughout the deep tilled layer.

CONSIDERATIONS

Where restrictive layers are a concern, the effects of this practice can be enhanced by including deep rooted crops in the rotation that are able to extend to and penetrate the restrictive layer.

Research on numerous crops has shown that tillage conducted excessively deeper than the compacted layer does not promote increased yields, requires excessive amounts of tillage energy, and promotes future compaction from nearby vehicle traffic.

Reduce or control equipment traffic during periods when soils are prone to compaction and formation of tillage pans.

Where unfavorable soil materials such as high sodium, calcium, gypsum or other undesirable materials, are within anticipated deep tillage depth and would be brought to the surface by deep tillage operations, this practice should not be applied.

Transport of sediment-borne pollutant(s) offsite can be reduced when this practice is used in a conservation management system, by reducing the concentration of pollutants in the surface layer.

Beneficial effects are usually of varying duration and usually diminish annually. This is especially true if the management practices causing compaction continue to be used.

To help reduce compaction, it is desirable to conduct normal tillage operations when soil moisture is less than 50 percent of field capacity. When possible harvest operations should be avoided when soil moisture is greater than 50 percent of field capacity. Field harvest haul traffic should be limited to end rows or haul roads. Compacted regions between crop rows that are not fractured can assist in supporting vehicle traffic, limiting rutting and soil compaction beneath the row.

Wet – dry and freeze – thaw cycles have little or no effect on subsoil compaction. Varying tillage depths can reduce frequency of deep tillage. Once a compacted layer is established,

tap-rooted plants such as alfalfa have little effect on their removal.

Deep Tillage can be performed efficiently if the tractor is properly ballasted and has sufficient power to pull the subsoiler. About 75 percent of the PTO horsepower rating are available as drawbar horsepower under firm soil conditions. A properly ballasted tractor should weigh from 100 to 120 LB/PTO horsepower. Thus, a 150 horsepower tractor should weight between 15,000 and 18,000 pounds.

If application of this practice will impact cultural resources (Archaeological, historic, historic landscape, or traditional cultural properties), follow NRCS national policy and State operating procedures for considering cultural resources.

PLANS AND SPECIFICATIONS

Specifications for establishment and operation of this practice shall be prepared for each field or treatment unit according to the Criteria, Considerations and Operations & Maintenance described in this standard.

OPERATION AND MAINTENANCE

Deep Tillage for reduction of soil compaction shall be performed whenever compaction reoccurs.

When deep tillage has been performed to reduce the concentration of soil contaminates, the contaminate levels in the root zone shall be monitored to assist with determining when or if treatment will be reapplied.

REFERENCES

Colorado State University Cooperative Extension Bulletin No. 0.519

University of Nebraska Cooperative Extension Bulletin G89-896-A

University of Nebraska Cooperative Extension Bulletin G87-831-A

University of Nebraska Cooperative Extension Bulletin NF 96-258